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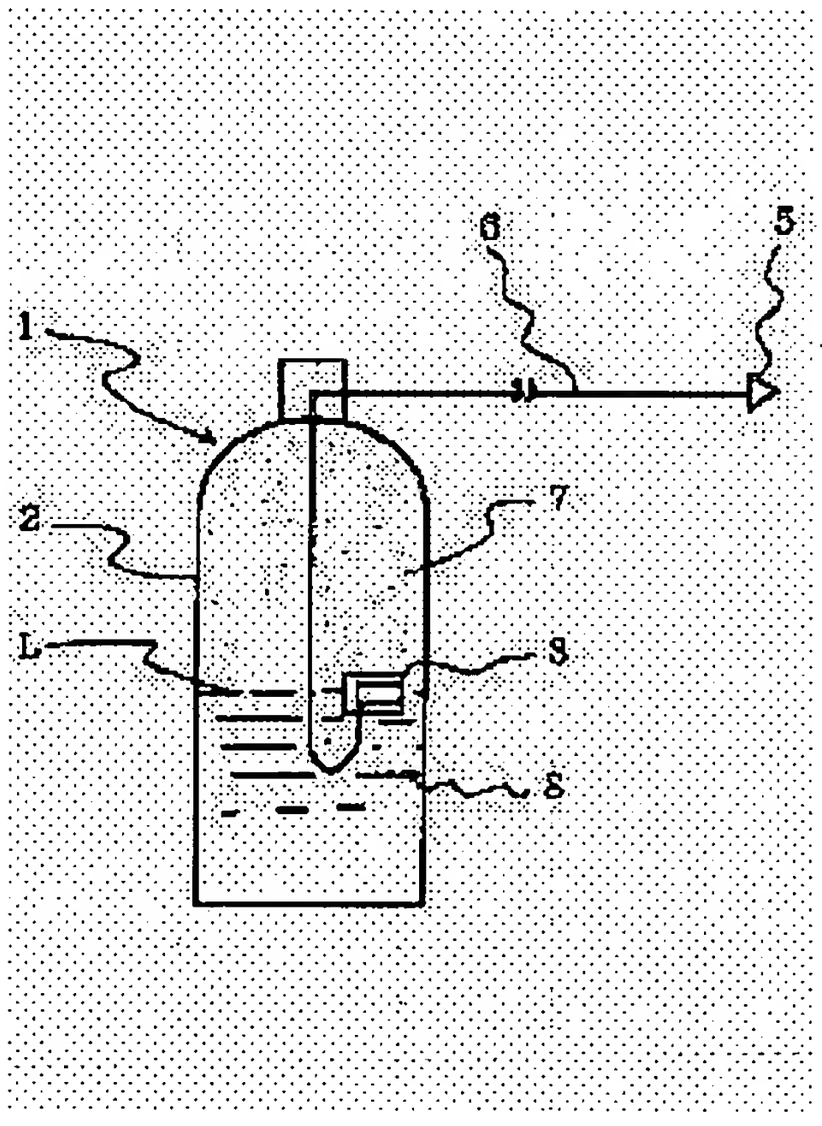
(54) FOG FIRE EXTINGUISHING METHOD AND DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To make a fire extinguish liquid reach a fire source in the form of fog by enclosing a fire extinguishing liquid and pressurized gas, and alternately spraying both from a fog nozzle.

SOLUTION: Pressurized gas 7 and a fire extinguishing liquid 8 are enclosed in a pressure container 2, and a selector float 3 is provided as a fluid selector means for alternately supplying the fire extinguishing liquid 8 and the pressurized gas 7 to a fog nozzle 5. When a fire occurs, one opening the valve of a nozzle hose 6, the fire extinguishing liquid 8 is sprayed through the nozzle hose 6 from the fog nozzle 5 by pressure of the pressurized gas 7. By such spraying, the liquid level L is disturbed so that the state where only the fire extinguishing liquid 8 or the pressurized gas 7 is sucked from a fluid suction port is repeated in a short cycle. Accordingly, short cycle injection of pressurized gas 7 only occurs, so that injection is repeated in irregular cycle in the order of the fire extinguishing liquid 8 → the pressurized gas 7 → the fire extinguishing liquid 8. Thus, the fog of the fire extinguishing liquid 8 can be forced to reach a fire source by the pressurized gas 7.



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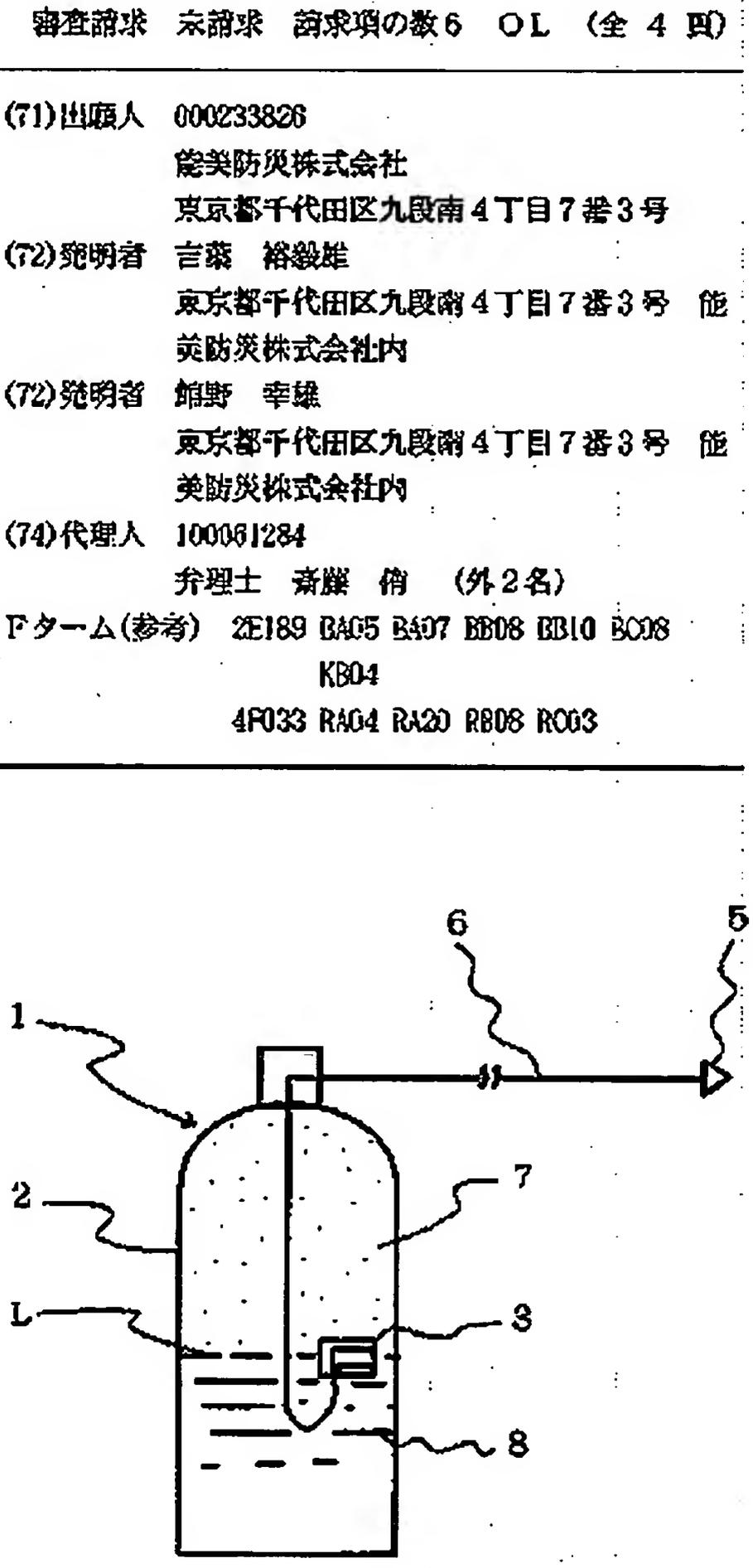
(54)【発明の名称】　フォグ消火方法及びその装置

(57)【要約】
【課題】霧状の消火液が火源に到達できる様にするとともに、配管設備コストの低減化を図る。
【解決手段】加圧容器２内に消火液８と加圧気体７とが封入され、該消火液８と加圧気体７とが交互にフォグノズル５から噴霧される。



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【特許請求の範囲】
【請求項１】圧力容器内の消火液をフォグノズルから噴出せしめるフォグ消火方法であって；該圧力容器に消火液と加圧気体とが封入され．
該消火液と加圧気体とが交互に前記フォグノズルから噴霧されることを特徴とすることを特徴とするフォグ消火方法。
【請求項２】噴霧される加圧気体が．消火液を含んでいることを特徴とする請求項１記載のフォグ消火方法。
【請求項３】圧力容器に消火液と加圧気体とを封入し、該加圧容器をフォグノズルに連通せしめたフォグ消火装置であって；前記消火液と加圧気体とを交互にフォグノズルに供給するための流体切換手段を設けたことを特徴とする噴霧消火装置。
【請求項４】流体切換手段は、圧力容器内に設けられ、かつ．液体吸込口を有する流体切替フロートと、一端が該フロートの流体吸込口に連通し、かつ、他端がフォグノズルに接続されているノズルホースと、からなることを特徴とする請求項３記載の噴霧消火装置。
【請求項５】流体切換手段は、一端が圧力容器内の液体室内に位置し．かつ、他端がフォグノズルに接続されたノズルホースと．圧力容器の気体室内のノズルホースに設けられた自動開閉バルブと、からなることを特徴とする請求項３記載の噴霧消火装置。
【請求項６】前記消火液と前記加圧気体が、各々別の圧力容器に封入されていることを特徴とする請求項３記載のフォグ消火装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】この発明は．フォグ消火方法及びその装置に関するものである。
【０００２】
【従来の技術】フォグ消火方法は、消火液を霧状にして放射し消火する方法であるが、この消火方法には次の利点がある。
(1)同じ水量で比較すると粒子径の小さい方が表面積が大きいので、吸熱面積も大きくなり冷却効率が良い。
【０００３】(2)粒子径の小さい方が蒸発しやすい分．気化熱による大きな冷却効果が期待できる。また．水蒸気が大量に発生し窒息効果が期待できる。
【０００４】従来のフォグ消火装置は液体だけを用いる１流体タイプと．ノズル内で液体と気体を混合してミストとして外へ放出する２流体タイプと．がある。１流体タイプは配管が１系統だけで良く設備上複雑にならないが．粒子の運動エネルギーが小さいため炎の上昇気流等にあおられて火源に到達しにくい。又．２流体タイプは粒子の移動速度が速いため．粒子の運動エネルギーが大きく．１流体タイプよりも火源に到達しやすいが．配管

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液が火源に到達できる様にするとともに、配管設備コストの低減化を図ることを目的とする。
【０００６】
【課題を解決するための手段】この発明は、圧力容器の消火液をフォグノズルから噴出せしめるフォグ消火方法であって；該圧力容器内に消火液と加圧気体とが封入され．該消火液と加圧気体とが交互に前記フォグノズルから噴霧されることを特徴とする。
【０００７】この発明は．圧力容器に消火液と加圧気体とを封入し、該加圧容器をフォグノズルに連通せしめたフォグ消火装置であって；前記消火液と加圧気体とを交互にフォグノズルに供給するための流体切換手段を設けたことを特徴とする。
【０００８】
【発明の実施の形態】本発明者は、前記一流体タイプと前記二流体タイプのフォグ消火方法は．それぞれ前述の様な利点を備えていることに鑑み、この両方の利点を生かせる消火方法を研究した。その結果．フォグノズルに消火液と加圧気体とを交互に供給し．それらを交互に噴霧すれば良いことがわかった。
【０００９】即ち、消火液のみを噴霧すると、消火液はノズル近傍に霧状となって漂うが、次に噴出される消火液より速度の速い加圧気体に巻き込まれて火源に向かう。そのため．霧の粒子と炎表面で発生した水蒸気が火源へ到達するとともに、炎源は吹き消し作用も受けることになる。
【００１０】なお、消火液と加圧気体とを交互にフォグノズルに供給する代わりに．消火液と．加圧気体に消火液が混入された混合流体とを交互にフォグノズルに供給し．噴霧しても良い。
【００１１】
【実施例】この発明の実施例を図１～図３により説明する。フォグ消火装置１は．圧力容器２と該圧力容器２内の液面Ｌに浮上する流体切換フロート３と、該切換フロート３とフォグノズル５とを連結するノズルホース６と．を備えている。
【００１２】圧力容器２には、加圧気体７と消火液８とが封入されている。この加圧気体７として、例えば、CO_2やN_2が用いられ、又．消火液として、例えば．消火水や水成膜泡消火薬剤としてのライトウオータ（商品名）が用いられる。また．加圧気体と消火液は周期的に交互に供給するのが好ましいが、必ずしもその必要はない。
【００１３】切換フロート３は、消火液８と加圧気体７とを交互にフォグノズル５に供給する流体切換手段である。このフロート３は、断面方形状の本体３ａと．軸心３ｃに平行な流体吹込口３ｂと、該流体吹込口３ｂと直交し．かつ、ノズルホース６が接続される連結口３ｄ

【００１４】フォグノズル５は周知のものが用いられるが．例えば、フォグの粒径を１０～３００μm位にできるものが選択される。

【００１５】次に、本実施例の作動について説明する。火災発生時に．例えばノズルホース６に設けられた図示しないバルブを開放すると．加圧気体７に押圧されている消火液８は．ノズルホース６を通ってフォグノズル５から噴霧される。

【００１６】該ノズル５から消火液８が噴霧されると、液面しが乱れ．流体吹込口３ｂからは消火液８又は加圧気体７だけ吸い込まれる状態が短周期に繰り返される。この周期は必ずしも一定の周期とは限らない。

【００１７】そうすると．フォグノズル５には．消火液８→加圧気体７→消火液８の順で繰り返し供給されるので．フォグのみ→フォグと気体→フォグのみの順で繰り返し噴霧される。

【００１８】消火液８がフォグノズル５から噴霧されると．フォグＦとなって飛散するが、このフォグＦは速度が遅いのでフォグノズル５の近傍に漂い、フォグ領域１０を形成する。

【００１９】次に、加圧気体７がフォグノズル５から噴霧されると、フォグＦよりも速度の速い加圧気体７が、フォグ領域１０内のフォグＦを巻き込んで搬送するので．フォグＦの粒子と炎Ｈ表面で発生した水蒸気が火源１２へ到達する。この時．加圧気体７の速い流れにより風が発生し、炎Ｈを吹く様にするので．該炎Ｈは鎖線で示す様になり．所謂吹き消し効果も発生する。

【００２０】この発明の第２実施例を図４により説明する。この実施例と第１実施例との相違点は、流体切換手段として自動開閉バルブ２０が用いられることである。このバルブ２０は、圧力容器２の気体室２１内に設けられており、開弁すると気体室２１内の加圧気体７がノズルホース６に供給され、閉弁すると消火液８がノズルホース６に供給される。このバルブ２０はフォグ消火装置１の外部に設けられた図示しない自動開閉制御スイッチとＰ電気的に接続されおり．該バルブ２０はこのスイッチをオすることにより開き．該スイッチをオフにすることにより閉じる。

＊【００２１】この発明の第３実施例を図５により説明する。この実施例と第２実施例との相違点は、自動開閉バルブ２５を圧力容器２内に設けるかわりに、該圧力容器２の外側に設けたことである。

【００２２】この発明の第４実施例を図６により説明する。この実施例と第１実施例との相違点は、圧力容器２の他に加圧気体を封入した容器３０を設け、両容器２，３０を三方切換弁３１を介してノズルホース６に連結し．該三方切換弁３１をモータなどで制御して．フォグと圧力気体とを交互に放出するようにしたことである。

【００２３】この発明の実施例は上記に限定されるものではなく、例えば、流体切換手段は消火液と加圧気体とを交互にノズルホースに供給できるものであれば良い。又．フォグノズルからフォグ→フォグ及び加圧気体→フォグの順で繰り返し噴霧する代わりに．フォグ→加圧気体→フォグの順で繰り返し噴霧する様にしてもよい。

【００２４】

【発明の効果】この発明は．以上の様に構成したので、フォグノズル近傍に漂っているフォグは、速度の速い加圧気体に巻き込まれて搬送される。そのため、フォグを火源に到達させることができるので．従来例に比べ消火効率の向上を図ることができる。

【図面の簡単な説明】

【図１】本発明の第１実施例を示す縦断面図である。

【図２】流体切換フロートの拡大断面図である。

【図３】消火状況を示す図である。

【図４】本発明の第２実施例を示す縦断面図である。

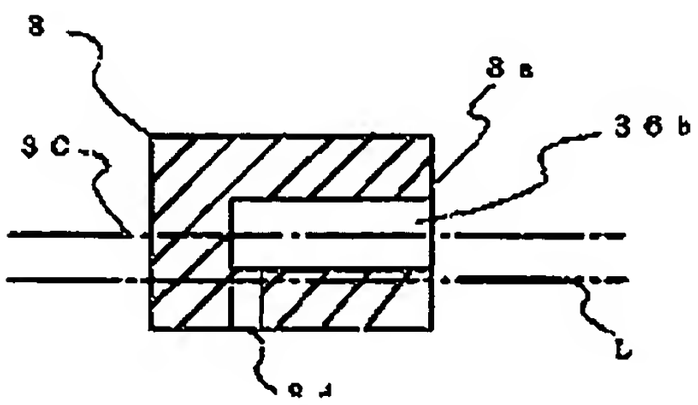
【図５】本発明の第３実施例を示す縦断面図である。

【図６】本発明の第４実施例を示す縦断面図である。

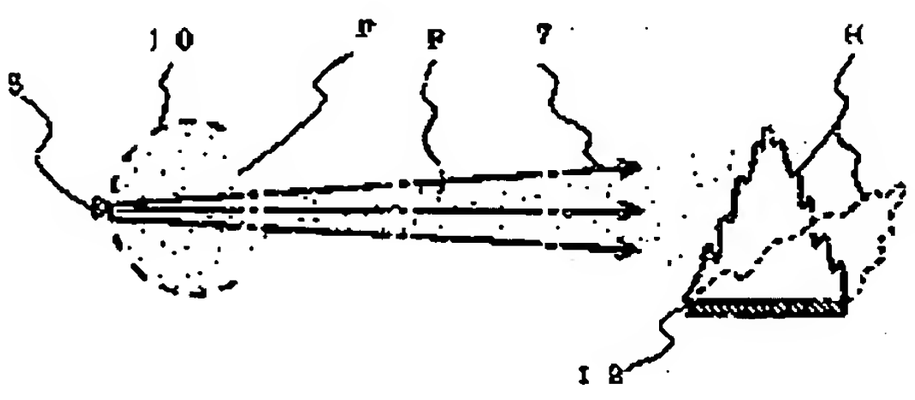
【符号の説明】

１	フォグ消火装置
２	圧力容器
３	流体切換フロート
５	フォグノズル
６	ノズルホース
７	加圧気体
８	消火液

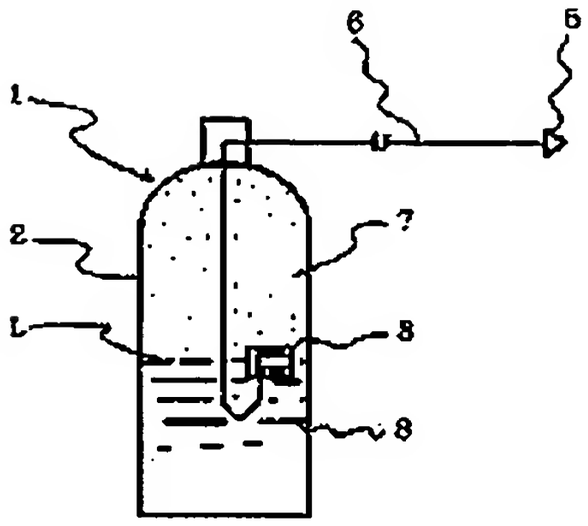
【図２】



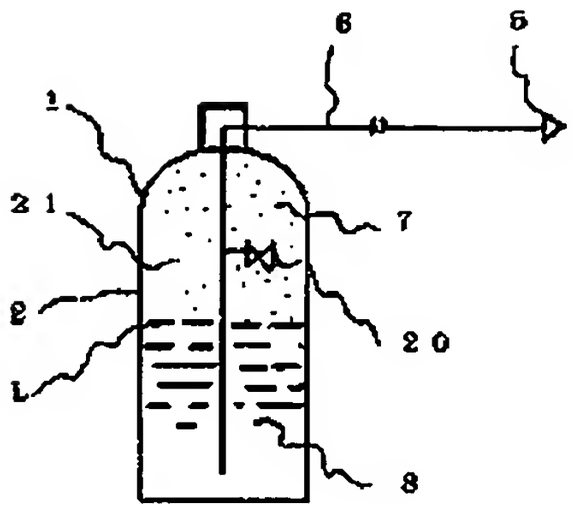
【図３】



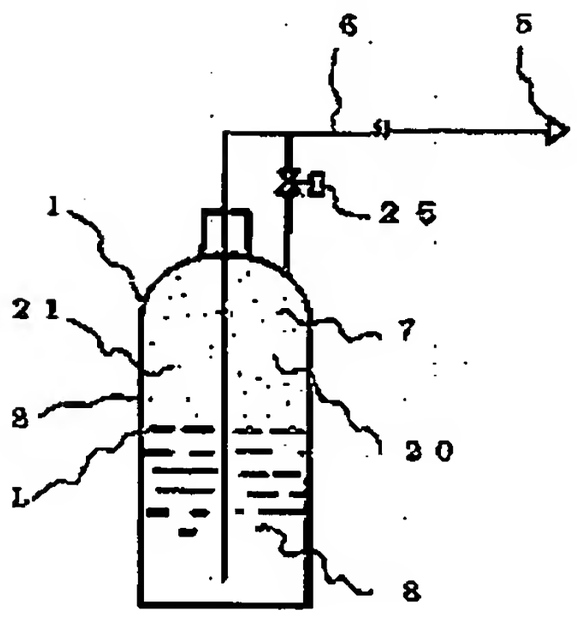
【図１】



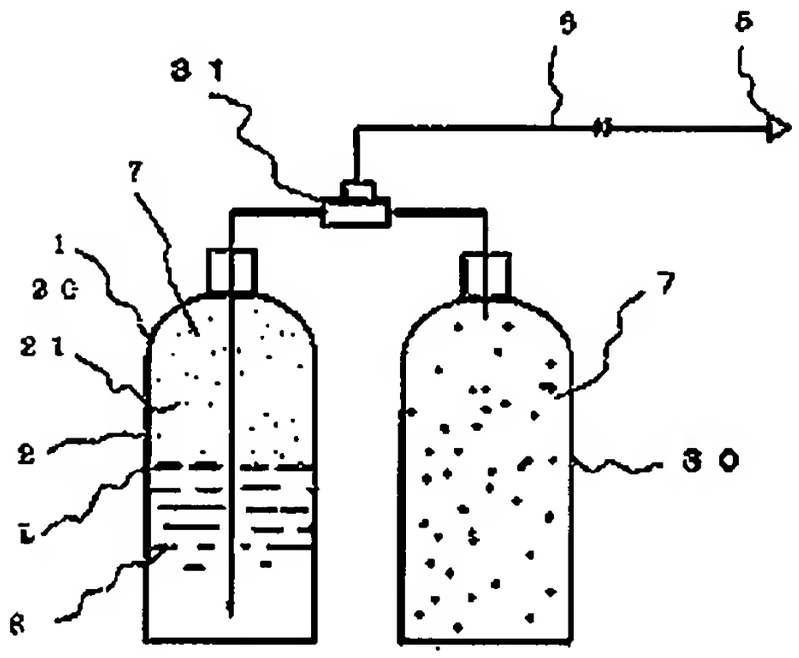
【図４】



【図５】



【図６】



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CLAIMS

[Claim(s)]
[Claim 1] The fog fire-extinguishing approach characterized by being characterized by being the fog fire-extinguishing approach of being able to blow off from a fog nozzle and closing the fire-extinguishing liquid in a pressurized container, enclosing fire-extinguishing liquid and a pressurization gas with; this pressurized container, and spraying this fire-extinguishing liquid and a pressurization gas from said fog nozzle by turns.
[Claim 2] The fog fire-extinguishing approach according to claim 1 that the pressurization gas sprayed is characterized by including fire-extinguishing liquid.
[Claim 3] The spraying fire extinguisher system which is a fog fire extinguisher system which fire-extinguishing liquid and a pressurization gas were enclosed [fire extinguisher system] with the pressurized container, and made the fog nozzle open this pressurization container for free passage, and is characterized by establishing the fluid means for switching for supplying the; aforementioned fire-extinguishing liquid and a pressurization gas to a fog nozzle by turns.
[Claim 4] the nozzle hose by which the fluid change float which a fluid means for switching is established in a pressurized container, and has fluid inlet port, and an end are open for free passage to the fluid inlet port of this float, and the other end is connected to the fog nozzle -- since -- the spraying fire extinguisher system according to claim 3 characterized by becoming.
[Claim 5] the automatic closing motion bulb by which the fluid means for switching was prepared in the nozzle hose by which the end was located in the liquid interior of a room in a pressurized container, and the other end was connected to the fog nozzle, and the nozzle hose of the gas interior of a room of a pressurized container -- since -- the spraying fire extinguisher system according to claim 3 characterized by becoming.
[Claim 6] The fog fire extinguisher system according to claim 3 to which said fire-extinguishing liquid and said pressurization gas are characterized by being respectively enclosed with another pressurized container.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the fog fire-extinguishing approach and its equipment.
[0002]
[Description of the Prior Art] Although the fog fire-extinguishing approach is the approach of making fire-extinguishing liquid the shape of a fog, emitting it, and extinguishing the fire, there is the following advantage in this fire-extinguishing approach.
(1) When the same amount of water compares, since surface area is large, the one where particle diameter is smaller becomes large, and endoergic area also has good cooling effectiveness.
[0003] (2) The big cooling effect by the part and heat of vaporization with which the one where particle diameter is smaller tends to evaporate is expectable. Moreover, a steam is generated in large quantities and the suffocation effectiveness can be expected.
[0004] The conventional fog fire extinguisher system is [1 fluid type which uses only a liquid, 2 fluid type which mixes a liquid and a gas within a nozzle and is emitted outside as Myst, and] ******. Although piping requires only one line and does not become complicated on a facility, since the kinetic energy of a particle is small, 1 fluid type is instigated by the ascending air current of flame etc., and cannot reach a fire source easily. Moreover, since 2 fluid type has the quick passing speed of a particle, the kinetic energy of a particle is large and tends to reach a fire source rather than 1 fluid type, but since two piping is required, it becomes a comparatively high-priced facility.
[0005] This invention aims at attaining reduction-ization of piping installation cost while fog-like fire-extinguishing liquid enables it to reach a fire source in view of the above-mentioned situation.
[0006]
[Means for Solving the Problem] This invention is the fog fire-extinguishing approach of being able to blow off from a fog nozzle and closing the fire-extinguishing liquid of a pressurized container, and is characterized by enclosing fire-extinguishing liquid and a pressurization gas and spraying this fire-extinguishing liquid and a pressurization gas from said fog nozzle by turns into; this pressurized container.
[0007] This invention encloses fire-extinguishing liquid and a pressurization gas with a pressurized container, is the fog fire extinguisher system which made the fog nozzle open this pressurization container for free passage, and is characterized by establishing the fluid means for switching for supplying the; aforementioned fire-extinguishing liquid and a pressurization gas to a fog nozzle by turns.
[0008]
[Embodiment of the Invention] this invention person studied the fire-extinguishing approach that the advantage of these both could be employed efficiently, in view of said first-class object type and said two-phase flow type of the fog fire-extinguishing approach being equipped with the respectively above advantages. Consequently, it turned out that what is necessary is to supply fire-extinguishing liquid and a pressurization gas to a fog nozzle by turns, and just to spray them by turns.
[0009] That is, if only fire-extinguishing liquid is sprayed, although fire-extinguishing liquid becomes fog-like and drifts near the nozzle, from the fire-extinguishing liquid which blows off next, it will be involved in the quick pressurization gas of a rate, and will go to a fire source. Therefore, while the steam generated on a misty particle and a misty flame front face reaches to a fire source, **** will blow out and will also receive an operation.
[0010] In addition, fire-extinguishing liquid and the interflow object with which fire-extinguishing liquid was mixed in the pressurization gas may be supplied and sprayed on a fog nozzle by turns instead of supplying fire-extinguishing liquid and a pressurization gas to a fog nozzle by turns.

[0011]
[Example] Drawing 1 - drawing 3 explain the example of this invention. The fog fire extinguisher system 1 is equipped with the nozzle hose 6 which connects the fluid change-over float 3 which surfaces on the oil level L in a pressurized container 2 and this pressurized container 2, this change-over float 3, and the fog nozzle 5.
[0012] The pressurization gas 7 and fire-extinguishing liquid 8 are enclosed with the pressurized container 2. As this pressurization gas 7, CO2 and N2 are used and the light water (trade name) as for example, fire-extinguishing water or aqueous-film-forming-foam fire-extinguishing drugs is used as fire-extinguishing liquid. Moreover, although supplying by turns periodically is desirable as for a pressurization gas and fire-extinguishing liquid, the need does not not necessarily exist.
[0013] The change-over float 3 is a fluid means for switching which supplies fire-extinguishing liquid 8 and the pressurization gas 7 to the fog nozzle 5 by turns. 3d of connection openings to which cross-section rectangle-like body 3a, fluid blowing-in opening 3b parallel to axial center 3c, this fluid blowing-in opening 3b, and this float 3 cross at right angles, and the nozzle hose 6 is connected -- since -- it is constituted. The magnitude of this fluid blowing-in opening 3b and 3d of connection openings, a configuration, etc. are chosen suitably if needed.
[0014] That to which particle size of fog is made as for the fog nozzle 5 to about 10-300 micrometers, for example although a well-known thing is used is chosen.
[0015] Next, actuation of this example is explained. At the time of the outbreak of a fire, disconnection of the bulb which was prepared in the nozzle hose 6 and which is not illustrated sprays the fire-extinguishing liquid 8 currently pressed by the pressurization gas 7 from the fog nozzle 5 through the nozzle hose 6.
[0016] If fire-extinguishing liquid 8 is sprayed from this nozzle 5, the condition that only fire-extinguishing liquid 8 or the pressurization gas 7 is inhaled for an oil level L from turbulence and fluid blowing-in opening 3b will be repeated by the short period. This period is not not necessarily a fixed period.
[0017] If it does so, since the fog nozzle 5 will be repeatedly supplied in order of fire-extinguishing liquid 8 -> pressurization gas 7 -> fire-extinguishing liquid 8, only fog is repeatedly sprayed only in order of -> fog and gas -> fog.

[0018] Although it will become Fog F and will disperse if fire-extinguishing liquid 8 is sprayed from the fog nozzle 5, since the rate is slow, this fog F drifts near the fog nozzle 5, and forms the fog field 10.
[0019] Next, if the pressurization gas 7 is sprayed from the fog nozzle 5, since the quick pressurization gas 7 of a rate will involve in and convey the fog F in the fog field 10 from Fog F, the steam generated on the particle and flame H front face of Fog F reaches to a fire source 12. Since a wind occurs by the quick flow of the pressurization gas 7 and it is made to play Flame H at this time, the chain line comes to show this flame H, and it also generates the so-called blowout effectiveness.
[0020] Drawing 4 explains the 2nd example of this invention. The difference of this example and 1st example is that the automatic closing motion bulb 20 is used as a fluid means for switching. This bulb 20 is formed in the gas room 21 of a pressurized container 2, and if it opens, and the pressurization gas 7 in the gas room 21 will be supplied to the nozzle hose 6 and will close the valve, fire-extinguishing liquid 8 will be supplied to the nozzle hose 6. It connects with the automatic closing motion control switch and P electrical-and-electric-equipment target which were prepared in the exterior of the fog fire extinguisher system 1 and which do not illustrate, and this bulb 20 gets down, opens this bulb 20 by O [this switch], and is closed by turning OFF this switch.
[0021] Drawing 5 explains the 3rd example of this invention. The difference of this example and 2nd example is having prepared in the outside of this pressurized container 2 instead of forming the automatic closing motion bulb 25 in a pressurized container 2.
[0022] Drawing 6 explains the 4th example of this invention. The difference of this example and 1st example is forming the container 30 which enclosed the pressurization gas other than a pressurized container 2, connecting both the containers 2 and 30 with the nozzle hose 6 through the Mikata change-over valve 31, controlling this Mikata change-over valve 31 by a motor etc., and having made it emit fog and a pressure gas by turns.
[0023] The example of this invention is not limited above and a fluid means for switching just supplies fire-extinguishing liquid and a pressurization gas to a nozzle hose by turns. Moreover, you may make it spray repeatedly in order of fog -> pressurization gas -> fog instead of spraying repeatedly in order of fog -> fog and pressurization gas -> fog from a fog nozzle.
[0024]
[Effect of the Invention] Since this invention was constituted as mentioned above, the fog which is drifting near the fog nozzle is involved in the quick pressurization gas of a rate, and is conveyed. Therefore, since fog can be made to reach a fire source, improvement in fire-extinguishing effectiveness can be aimed at compared with the conventional

EXAMPLE

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forming the container 30 which enclosed the pressurization gas other than a pressurized container 2, connecting both the containers 2 and 30 with the nozzle hose 6 through the Mikata change-over valve 31, controlling this Mikata change-over valve 31 by a motor etc., and having made it emit fog and a pressure gas by turns.

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[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing of longitudinal section showing the 1st example of this invention.
[Drawing 2] It is the expanded sectional view of a fluid change-over float.
[Drawing 3] It is drawing showing a fire-extinguishing situation.
[Drawing 4] It is drawing of longitudinal section showing the 2nd example of this invention.
[Drawing 5] It is drawing of longitudinal section showing the 3rd example of this invention.
[Drawing 6] It is drawing of longitudinal section showing the 4th example of this invention.
[Description of Notations]
1 Fog Fire Extinguisher System
2 Pressurized Container
3 Fluid Change-over Float
5 Fog Nozzle
6 Nozzle Hose
7 Pressurization Gas
8 Fire-Extinguishing Liquid

[Translation done.]